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1991

# ENERGY AND MONTANA

## AN OVERVIEW

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ENVIRONMENTAL QUALITY COUNCIL

by the  
Montana Department of Natural Resources and Conservation  
Energy Division  
November 1, 1991

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## GLOSSARY

Average MW: Abbreviation for average Megawatt. A unit of energy output over a specified time period, equivalent to the total energy in MWh divided by 8,760 (the number of hours in a year).

Barrel: 42 U.S. gallons.

bcf: Abbreviation for billion cubic feet. See mcf.

Btu: Abbreviation for British Thermal Unit. A measure of heat content being the quantity of heat necessary to raise the temperature of 1 pound of water 1 degree Fahrenheit (elevate 59°F to 60°F, at 1 atmosphere pressure).

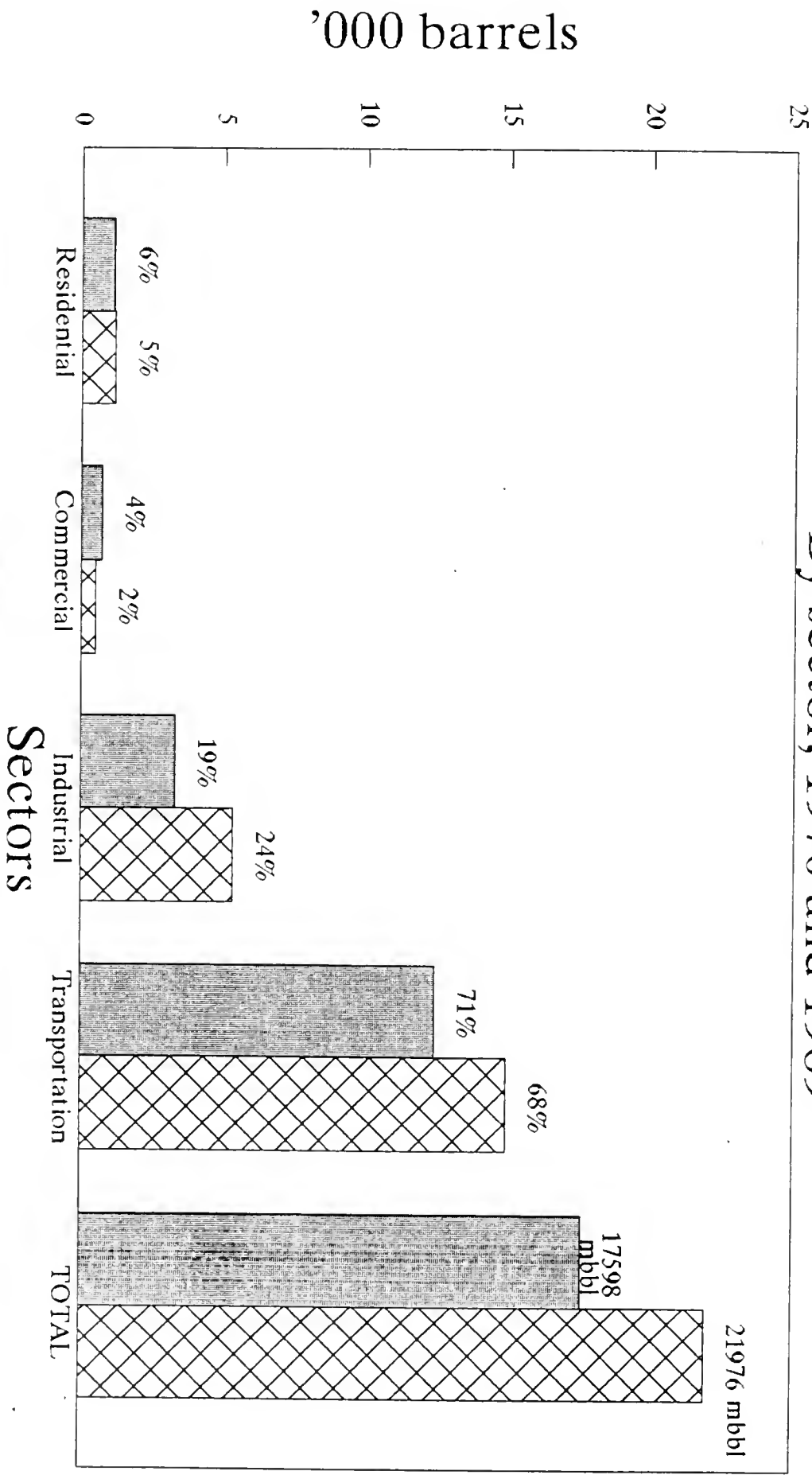
kWh: Abbreviation for kilowatt-hour. A watt is an electrical unit of power or rate of doing work, where 746 watts equals about 1 horsepower. A kilowatt-hour is one thousand watts supplied/consumed steadily for one hour. A kWh contains approximately 3,412 Btus.

mcf: Abbreviation for thousand cubic feet. A measure of gas volume. Burning 1 mcf of natural gas at 1 atmosphere pressure releases roughly 1 million Btus of heat.

MWh: Abbreviation for megawatt-hour, one million watt-hours. See kwh.

# PETROLEUM USE

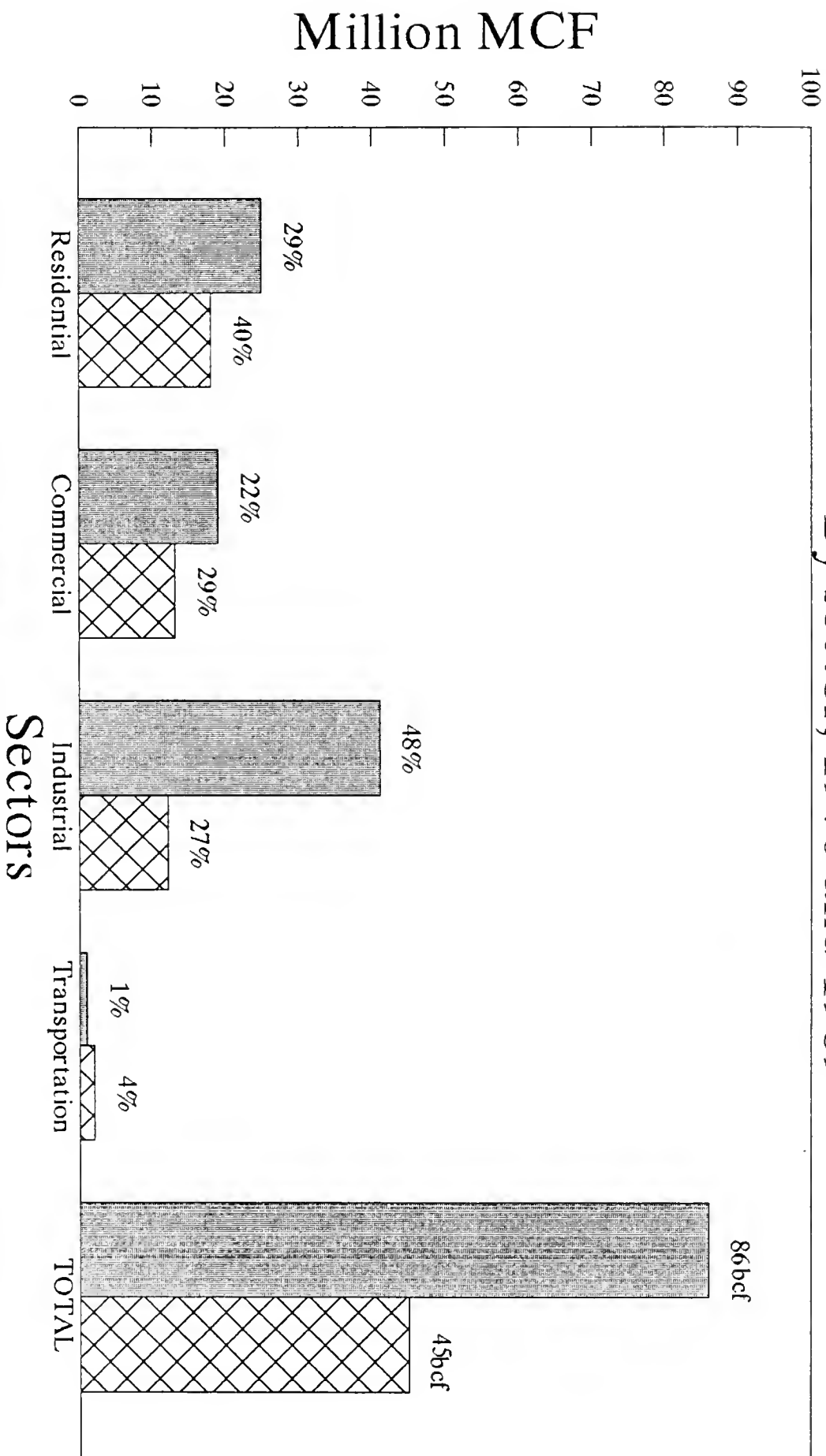
By sector, 1970 and 1989



NOTE: Industrial sector consumption does not include refinery use or asphalt; does include farm and off-highway use.  
The percentage of annual consumption is above each sector bar.

# NATURAL GAS USE

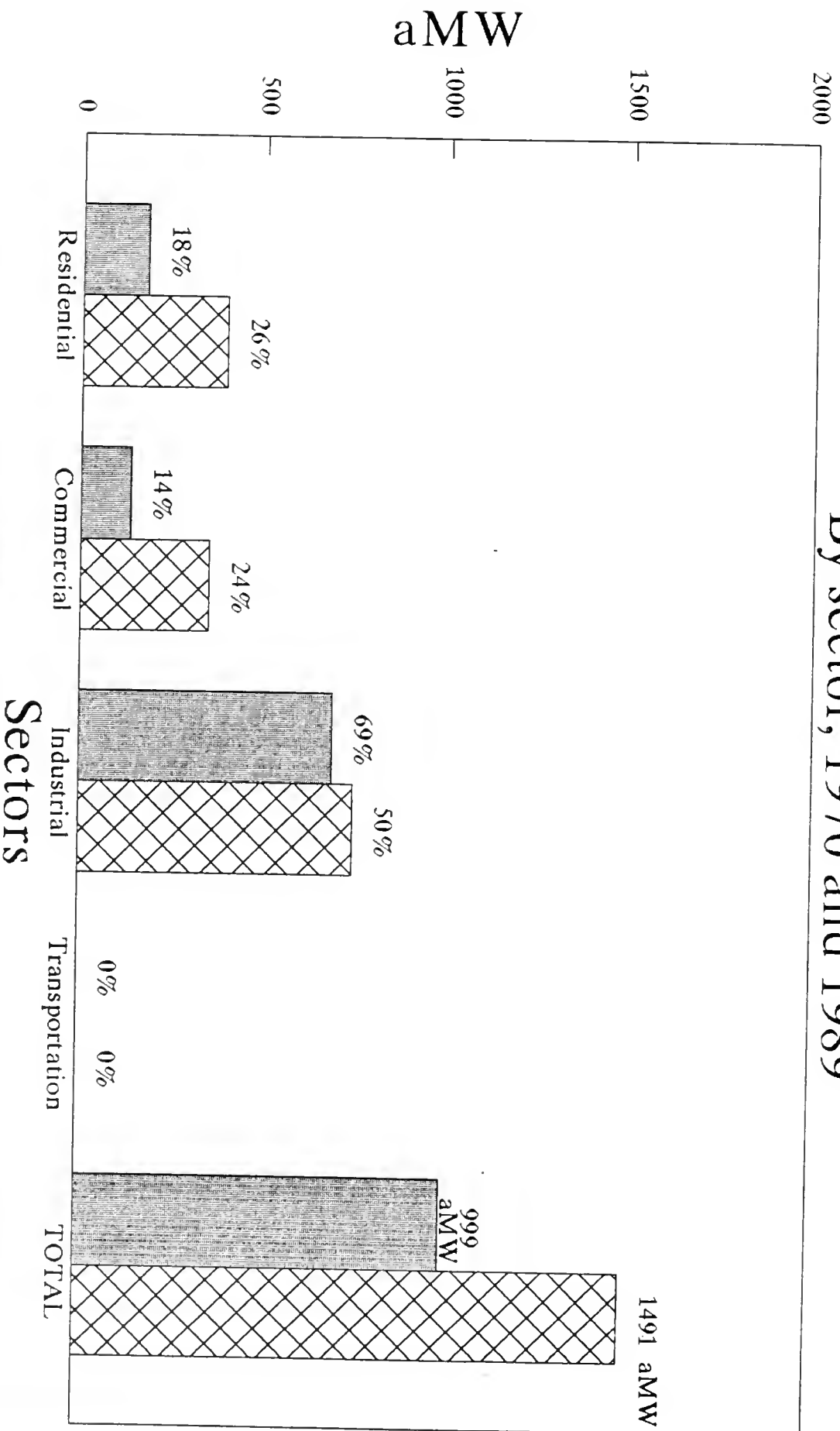
## By sector, 1970 and 1989



The percentage of annual consumption is shown above each sector.

# ELECTRICITY USE

By sector, 1970 and 1989



1970 1989

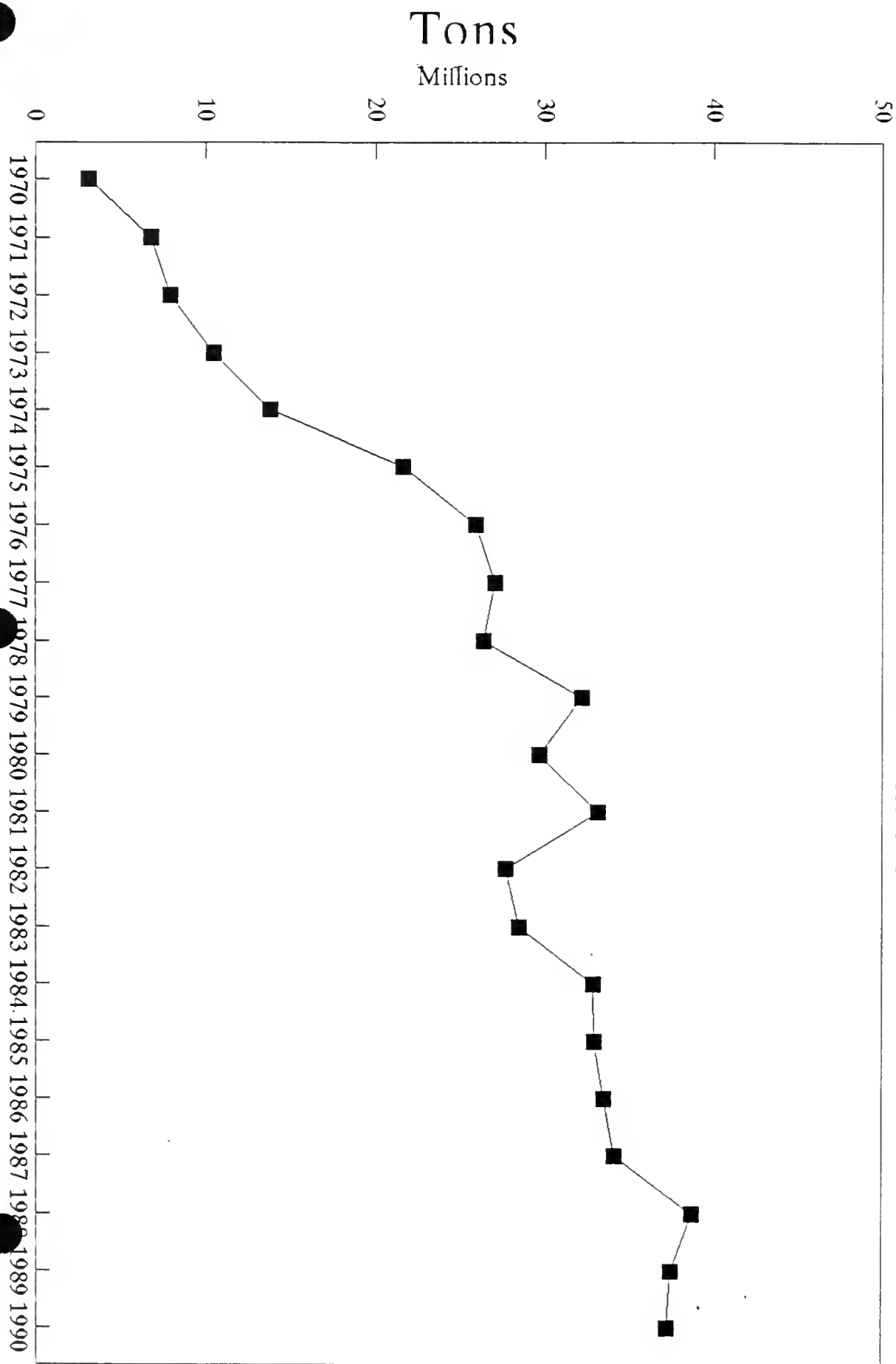
The percentage of annual consumption is above each sector bar.

# Montana's Rank Among Producing States

	1980	1990
Coal	9	8
Crude oil	14	14
Natural gas	16	18
Electricity	39	38

# SUBBITUMINOUS COAL

1970-1990

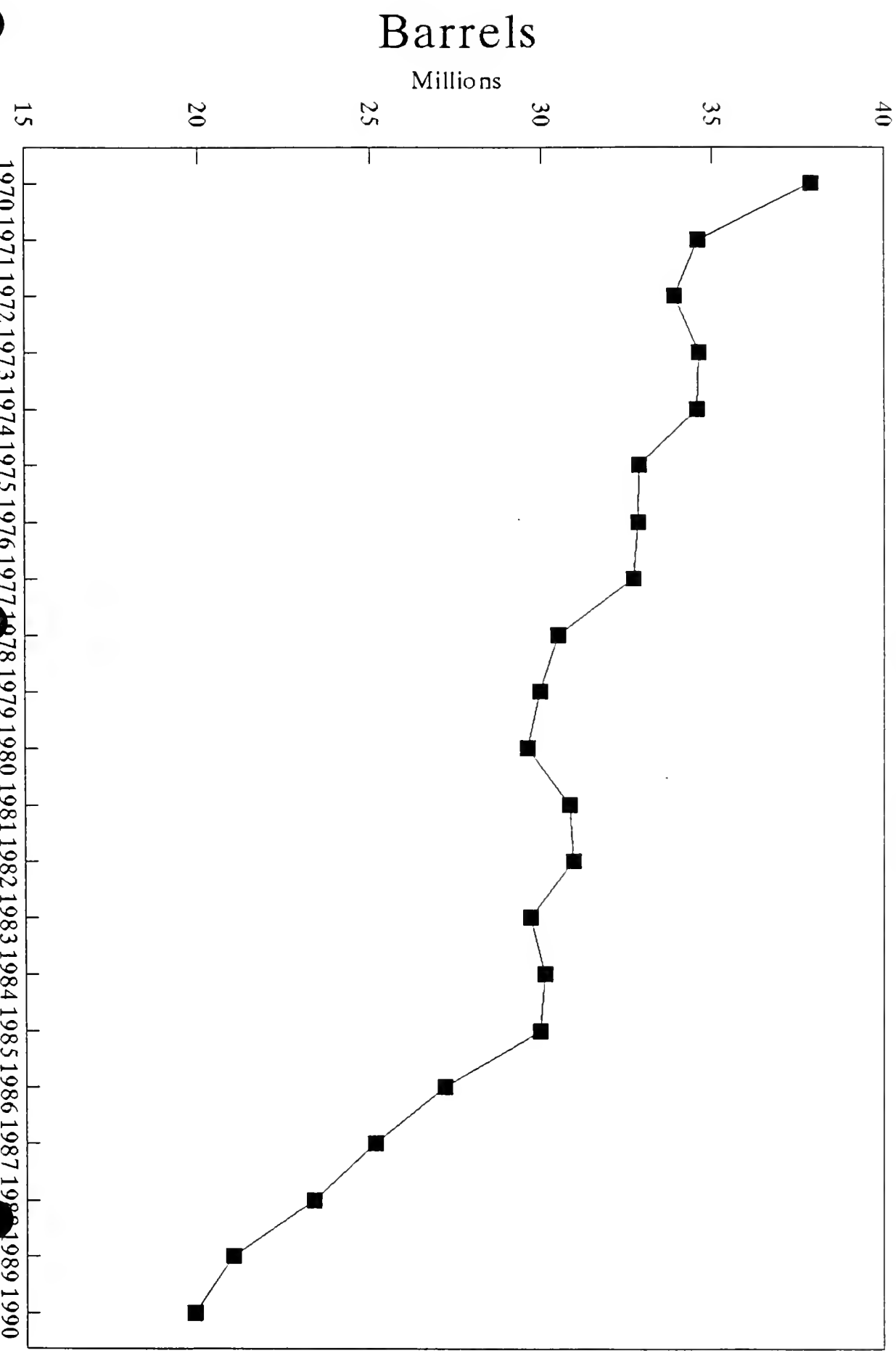




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# OIL PRODUCTION

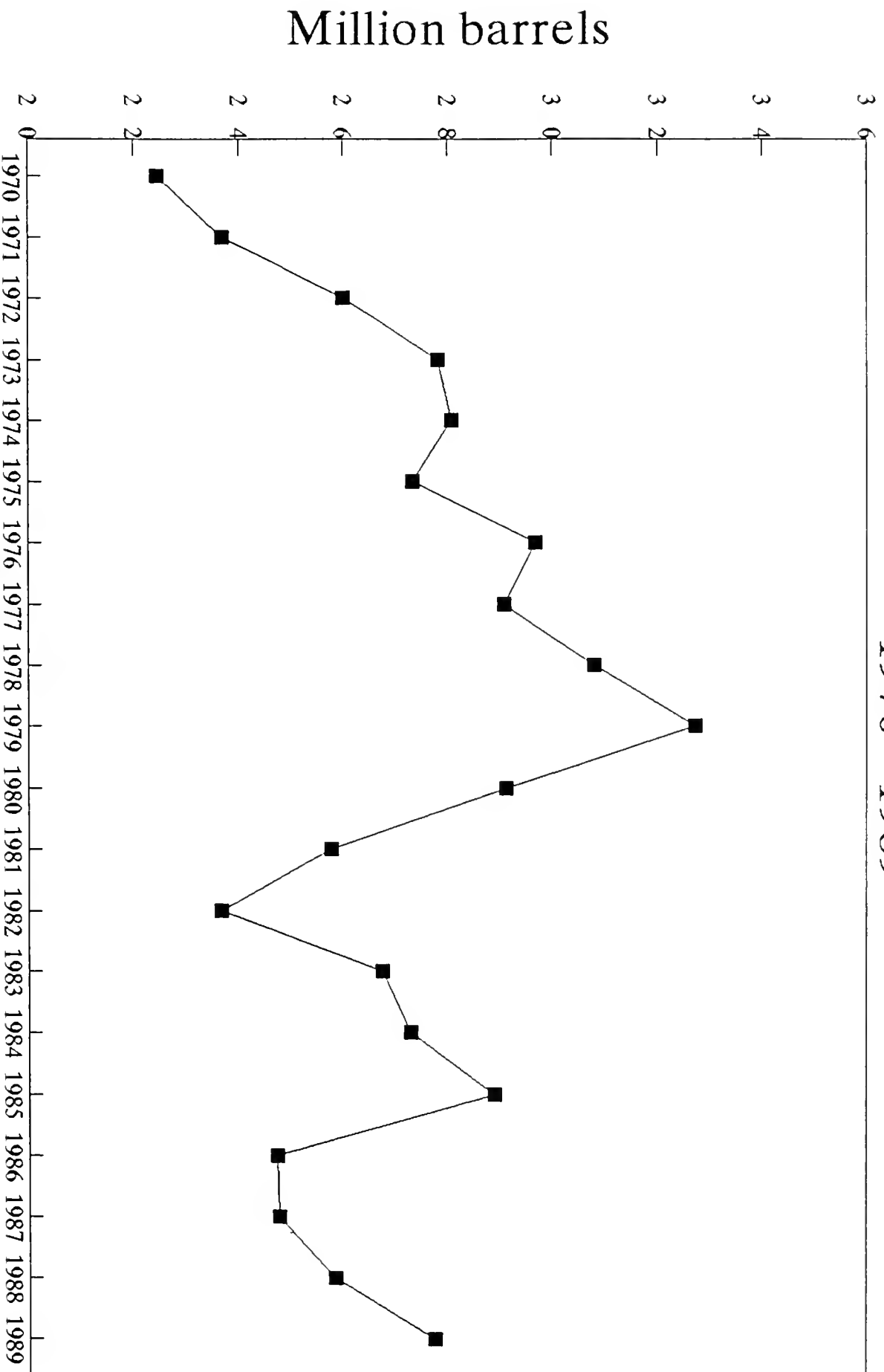
1970 - 1990



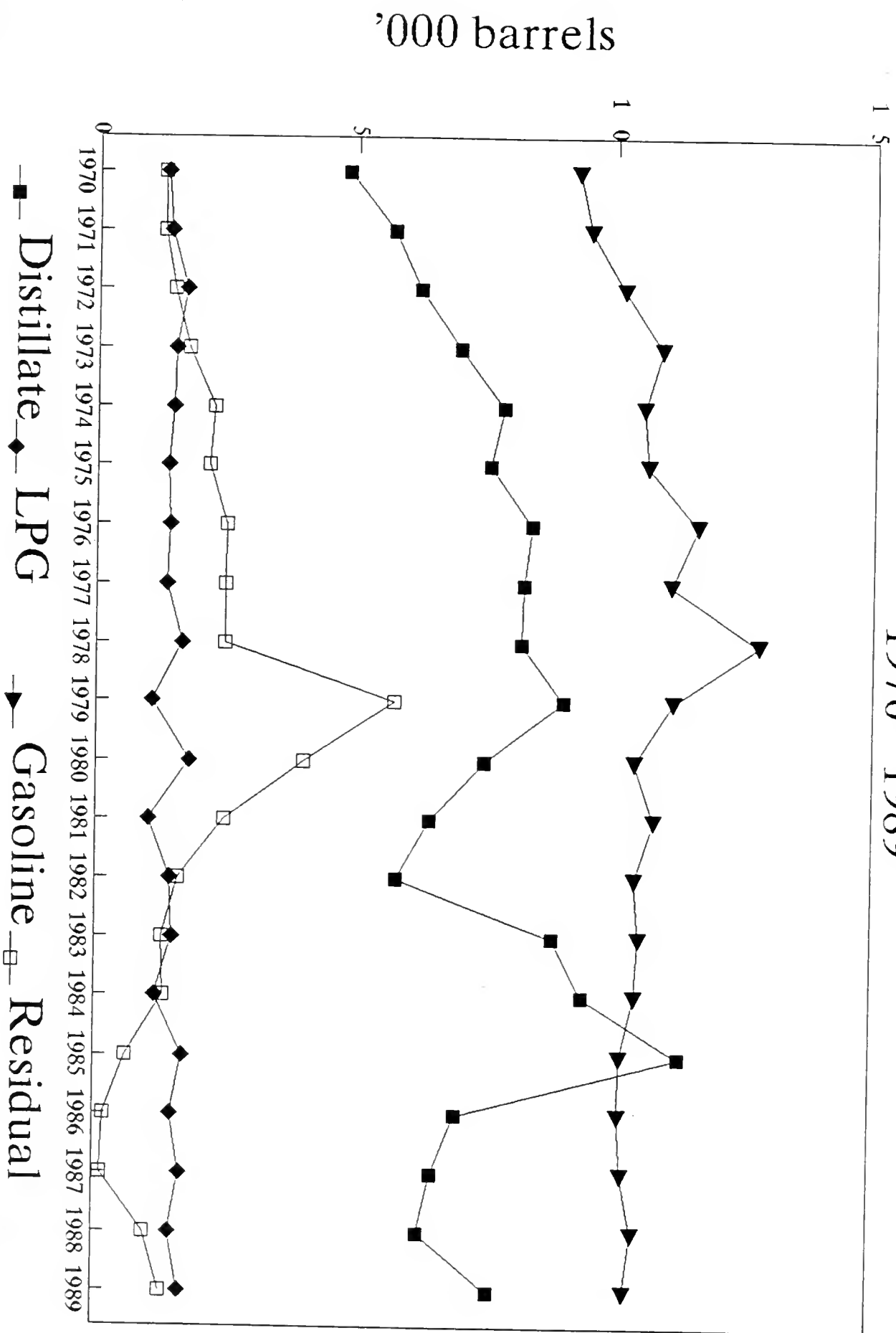


# OIL CONSUMPTION

1970-1989

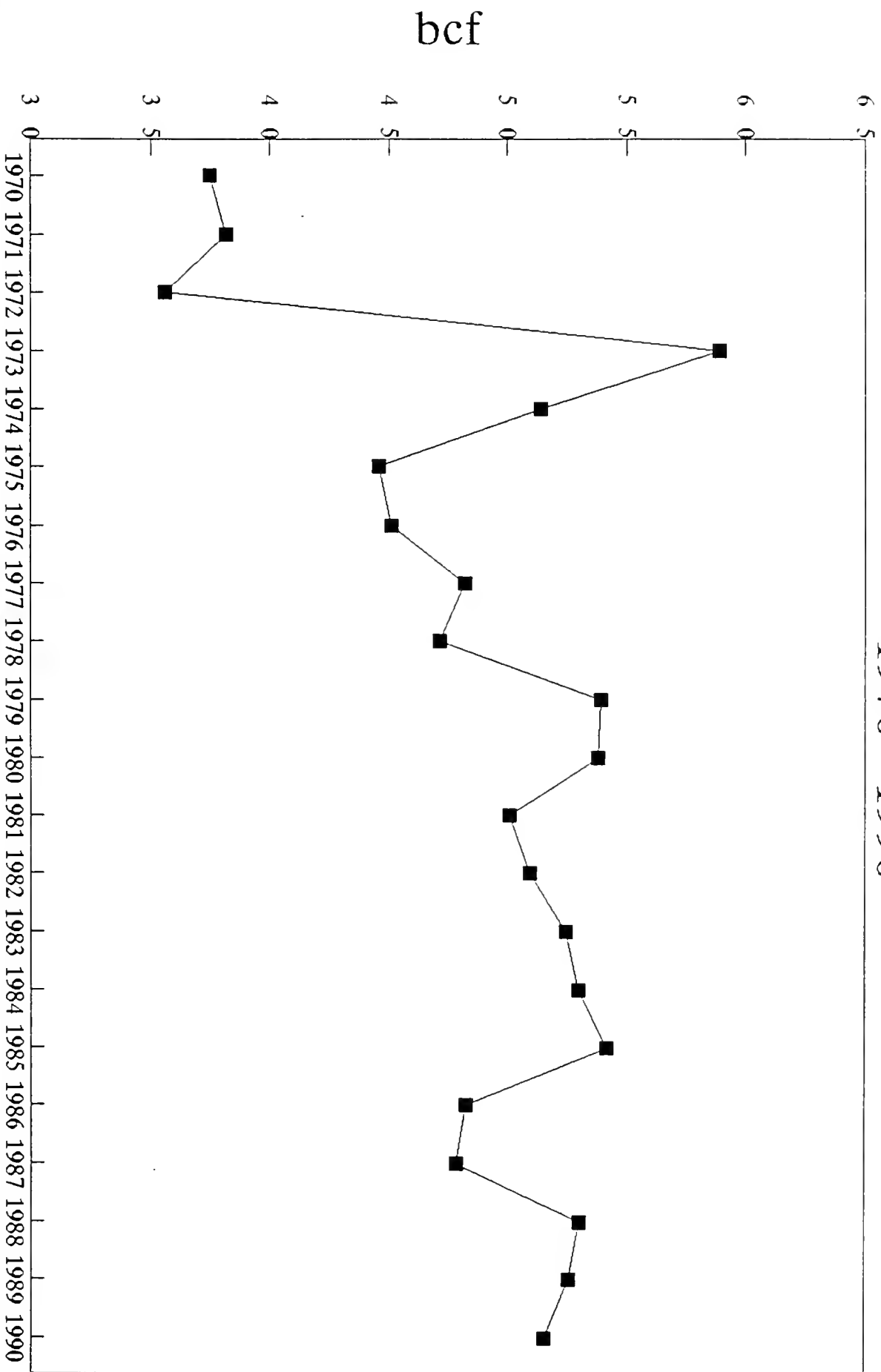


# PETROLEUM PRODUCT CONSUMPTION 1970-1989



# GAS PRODUCTION

1970-1990



LEGEND

INTERNATIONAL BOUNDARY

UNITED STATES

CANADA

PIPELINE OPERATORS

24 Chicago Interstate Gas Co.

107 Alberta Natural Gas Co. Ltd.

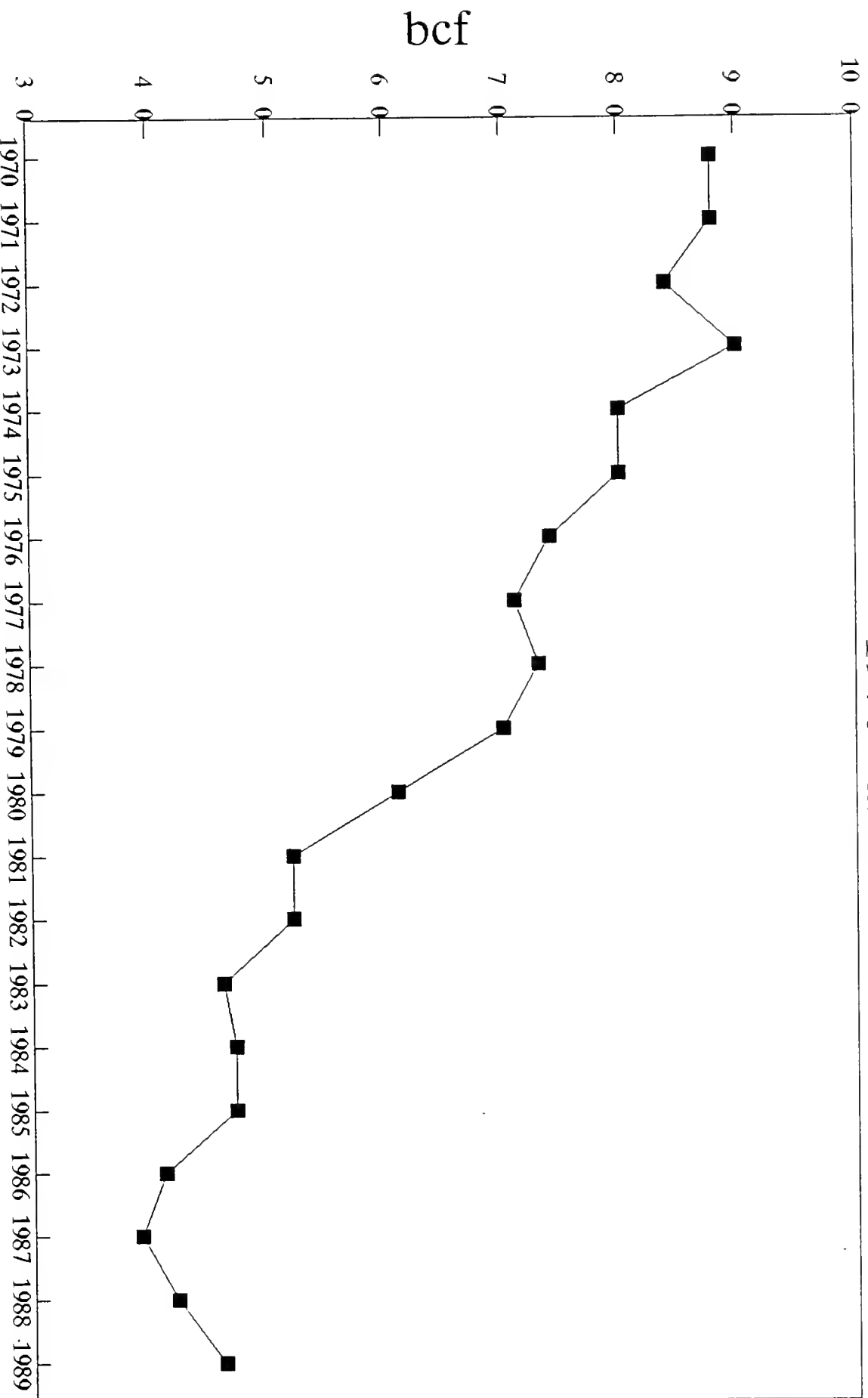
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NATURAL GAS PIPELINES

This map illustrates the extensive network of natural gas pipelines in the northern United States and southern Canada. The map is oriented with North at the top. Major pipelines shown include the Northern Border Pipeline running north-south through the center, and the Alberta Gas Transmission (AGT) Pipeline running east-west along the Canadian border. Other significant pipelines include the Trans-Alberta Pipeline (TAP) in the northwest, the Western Canadian System (WCS) in the west, and the Bakken Pipeline in the south. The map also shows numerous smaller regional pipelines and local distribution networks. Key cities and towns are marked, including Calgary, Edmonton, Regina, Winnipeg, and various locations in the US such as Denver, Cheyenne, and Salt Lake City. The map includes a legend in the top left corner defining symbols for international boundaries, pipeline operators, and specific gas companies. The title 'NATURAL GAS PIPELINES' is prominently displayed in the upper center.

# GAS CONSUMPTION

1970-1989



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**TABLE 2.1**  
**ELECTRIC POWER PLANTS BY PRIMARY FUEL, 1989**

**HYDROELECTRIC PLANTS**

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	Capacity <sup>1</sup> (megawatts)	CAPABILITY	
					Critical Water Year (average MW)	Median Water Year (average MW)
Champion International Corp.	Lake Creek	Lincoln	1916	5.0	2.3	2.8
Montana Department of Natural Resources and Conservation	Broadwater	Broadwater	1989	10.0	6.2	7.1
Montana Power Company	Black Eagle	Cascade	1927	18.0	14.0	18.0
Montana Power Company	Cochrane	Cascade	1958	50.0	22.0	34.0
Montana Power Company	Flint Creek	Granite	1901	1.1	1.0	1.0
Montana Power Company	Hauser Lake	Lewis & Clark	1907	16.5	12.0	16.0
Montana Power Company	Holter	Lewis & Clark	1918	49.0	24.0	30.0
Montana Power Company	Kerr	Lake	1938	180.0	119.0	128.0
Montana Power Company	Milltown	Missoula	1906	3.4	2.0	2.0
Montana Power Company	Morony	Cascade	1930	47.0	25.0	36.0
Montana Power Company	Mystic Lake	Stillwater	1925	11.5	6.0	6.0
Montana Power Company	Rainbow	Cascade	1910	35.0	29.0	35.0
Montana Power Company	Ryan	Cascade	1915	60.0	41.0	56.0
Montana Power Company	Thompson Falls	Sanders	1915	40.0	35.0	34.0
Montana Power Company	Madison	Madison	1906	8.5	7.0	8.0
Pacific Power & Light Co.	Bigfork	Flathead	1910	4.0	3.0	3.5
U.S. Dept. of the Army, North Pacific Division Corps of Engineers	Libby	Lincoln	1975	525.0	180.0	220.0
U.S. Dept. of the Army, Missouri River Division, Corps of Engineers	Fort Peck	McCone	1943	185.0	83.0	119.0
Mission Valley Power Co.	Hell Roaring	Lake	1915	0.4	NA	NA
U.S. Dept. of the Interior, Bureau of Reclamation, Great Plains Region	Canyon Ferry	Lewis & Clark	1953	50.0	30.4	45.9
U.S. Dept. of the Interior, Bureau of Reclamation, Great Plains Region	Yellowtail	Big Horn	1966	250.0	60.3	103.9
U.S. Dept. of the Interior, Bureau of Reclamation, Pacific Northwest Region	Hungry Horse	Flathead	1952	285.0	96.0	108.0
Washington Water Power Co.	Noxon Rapids	Sanders	1959	467.0	152.0	215.0

**TOTAL HYDROELECTRIC CAPABILITY**

**2,301.4 megawatts**



**TABLE 2.1 (continued)**  
**FOSSIL FUEL FIRED PLANTS**

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	CAPABILITY		Fuel
				Capacity <sup>1</sup> (megawatts)	Average (average MW)	
Montana-Dakota Utilities	Glendive	Dawson	1979	34.8		natural gas; #2 fuel oil
Montana-Dakota Utilities	Lewis & Clark	Richland	1958	50.9		lignite
Montana-Dakota Utilities	Miles City	Custer	1972	24.2		natural gas; #2 fuel oil
Montana Power Company	Frank Bird	Yellowstone	1951	60.0	3.0	oil; natural gas
Montana Power Company	J.E. Corette	Yellowstone	1968	156.0	125.0	subbituminous coal
Montana Power Company and Puget Sound Power & Light	Colstrip I	Rosebud	1975	314.0	245.0	subbituminous coal
Montana Power Company, Puget Sound Power & Light	Colstrip II	Rosebud	1976	320.0	246.0	subbituminous coal
Montana Power Company Puget Sound Power & Light, Portland General Electric, Washington Water Power, and Pacific Power & Light	Colstrip III	Rosebud	1984	720.0	562.0	subbituminous coal
Montana Power Company Puget Sound Power & Light, Portland General Electric, Washington Water Power, and Pacific Power & Light	Colstrip IV	Rosebud	1985	720.0	562.0	subbituminous coal
<b>TOTAL FOSSIL FUEL FIRED CAPABILITY</b>				<b>2,399.9 megawatts</b>		

**OTHER PLANTS**

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	CAPABILITY		Fuel
				Capacity <sup>1</sup> (megawatts)	Average (average MW)	
Champion International Corp.	Libby	Lincoln	1939	12.5	7.6	wood and waste products

**TOTAL CAPABILITY OF OTHER PLANTS**

**12.5**

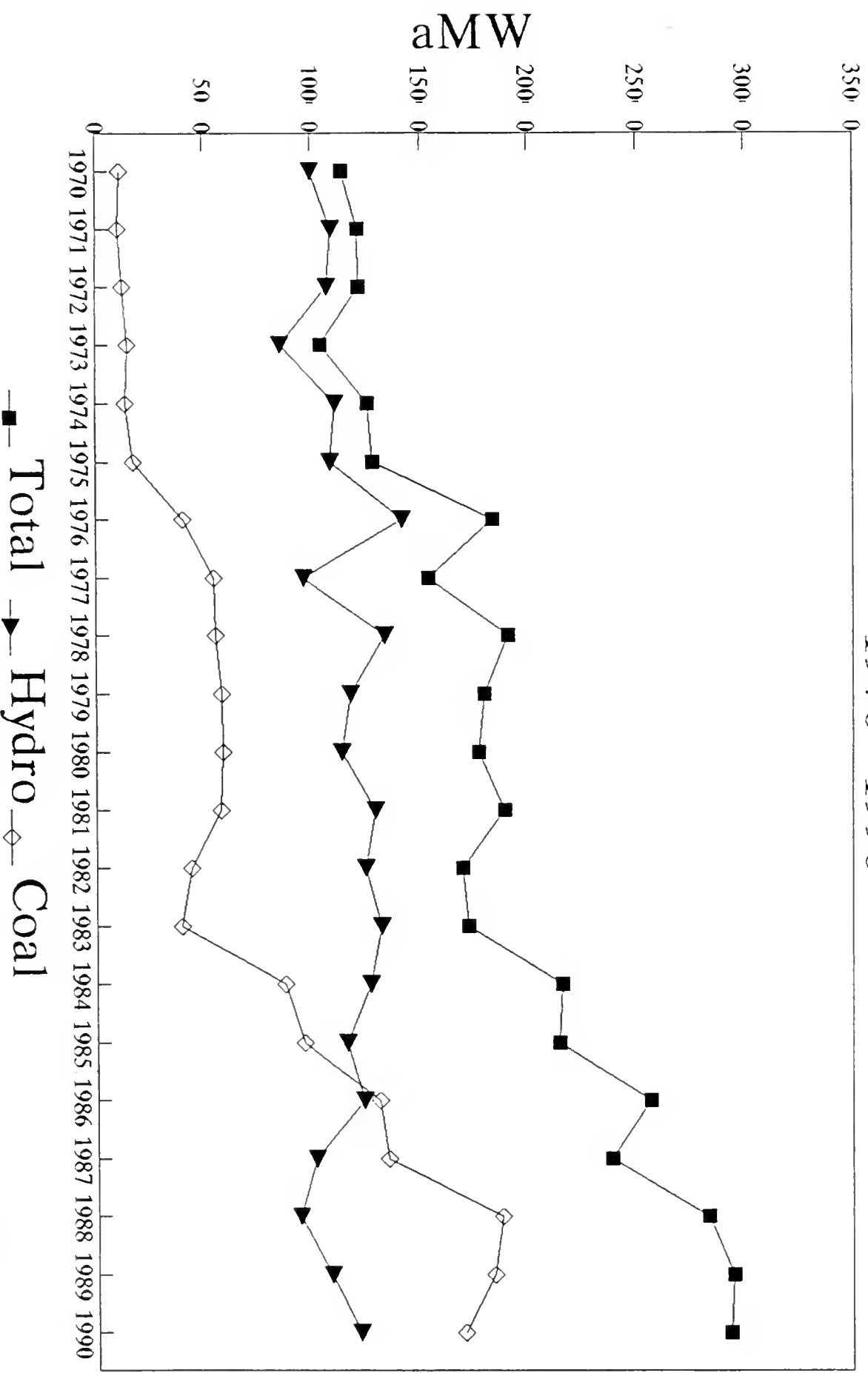
**TOTAL MONTANA GENERATING CAPABILITY**

**4,713.8 megawatts**

<sup>1</sup> Unless otherwise specified, capacity denotes installed nameplate capacity

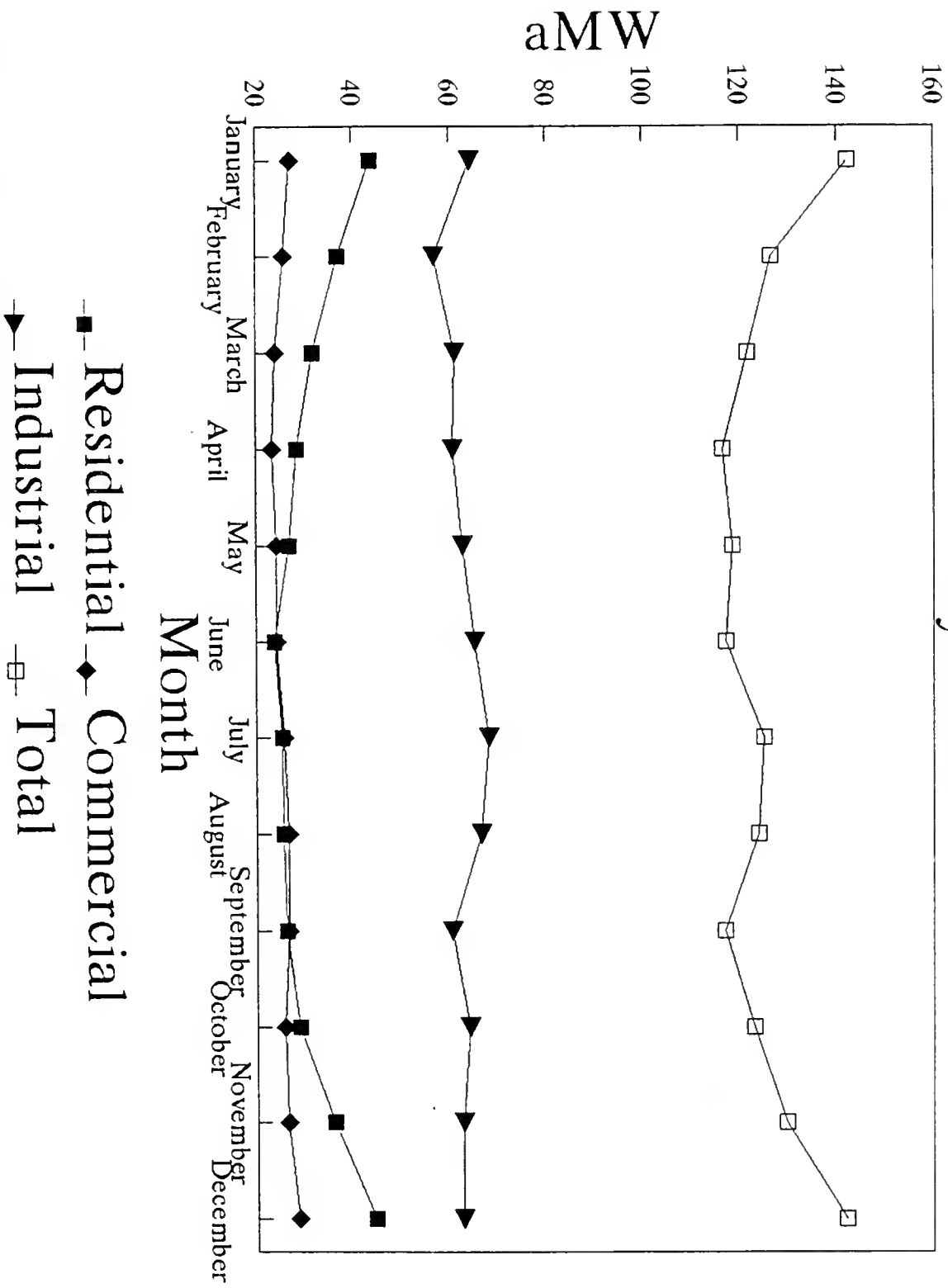
# ELECTRIC GENERATION

## 1970-1990



# 1990 ELECTRICAL SALE

By sector



Based on Table 2.3, Historical Statistics

# Retail Sales and Residential Customers

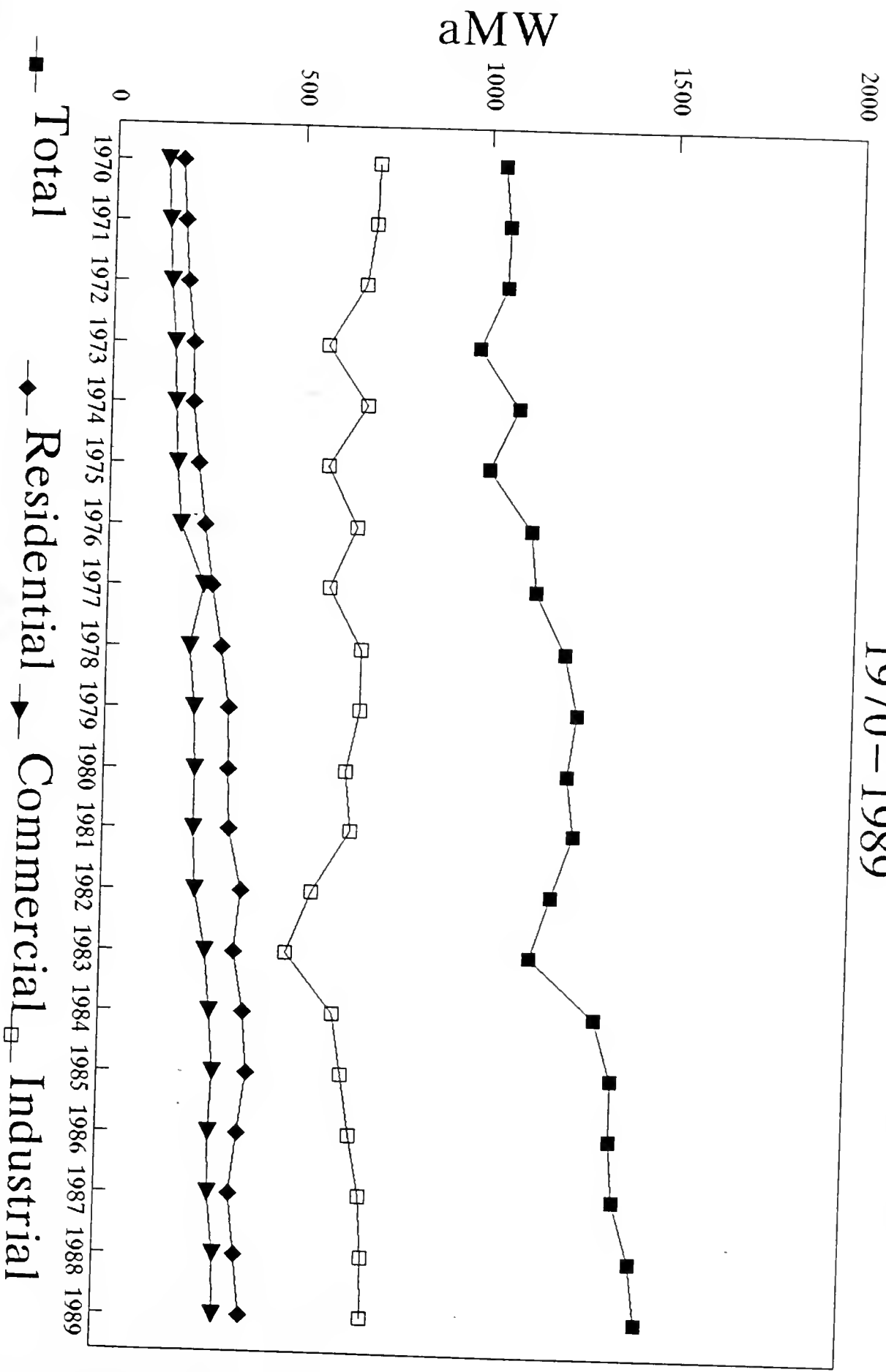
	Sales (aMW)	Customers
MPC	826.7	205,000
MDU	55.1	23,000
PP&L	79.5	25,000
BPA DSI	338.0	—
Western coops#	119.2	31,000*
Eastern coops	<u>111.2</u>	<u>34,000*</u>
Total	1530.0	318,000

\* Number of residential customers for coops was estimated.

# Western coops are those served by BPA. They're located in the western third of the state.

# ELECTRICITY SALES

1970-1989



# State-wide Sales by Sector, 1990

Residential	378.9 aMW
Commercial	309.0
CFAC	338.0
Other industrial	418.4
Other	<u>59.2</u>
Total Sales	1503.4 aMW

Line losses (est. 10%) 167.0

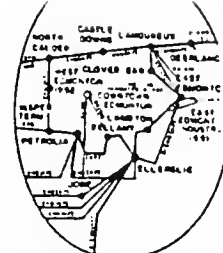
Total system requirements 1670.5 aMW

Exports (est) 1265.3 aMW

NOTE: Commercial and industrial end-use figures may be influenced by rate category definitions as well as by the actual nature of the businesses.

BRITISH COLUMBIA

ALBERTA



WASHINGTON

MONTANA

OREGON

IDAHO

WYOMING

NEVADA

UTAH

COLORADO

CALIFORNIA

ARIZONA

NEW MEXICO

SEE  
SACRAMENTO-  
DELTA  
AREA  
DETAIL

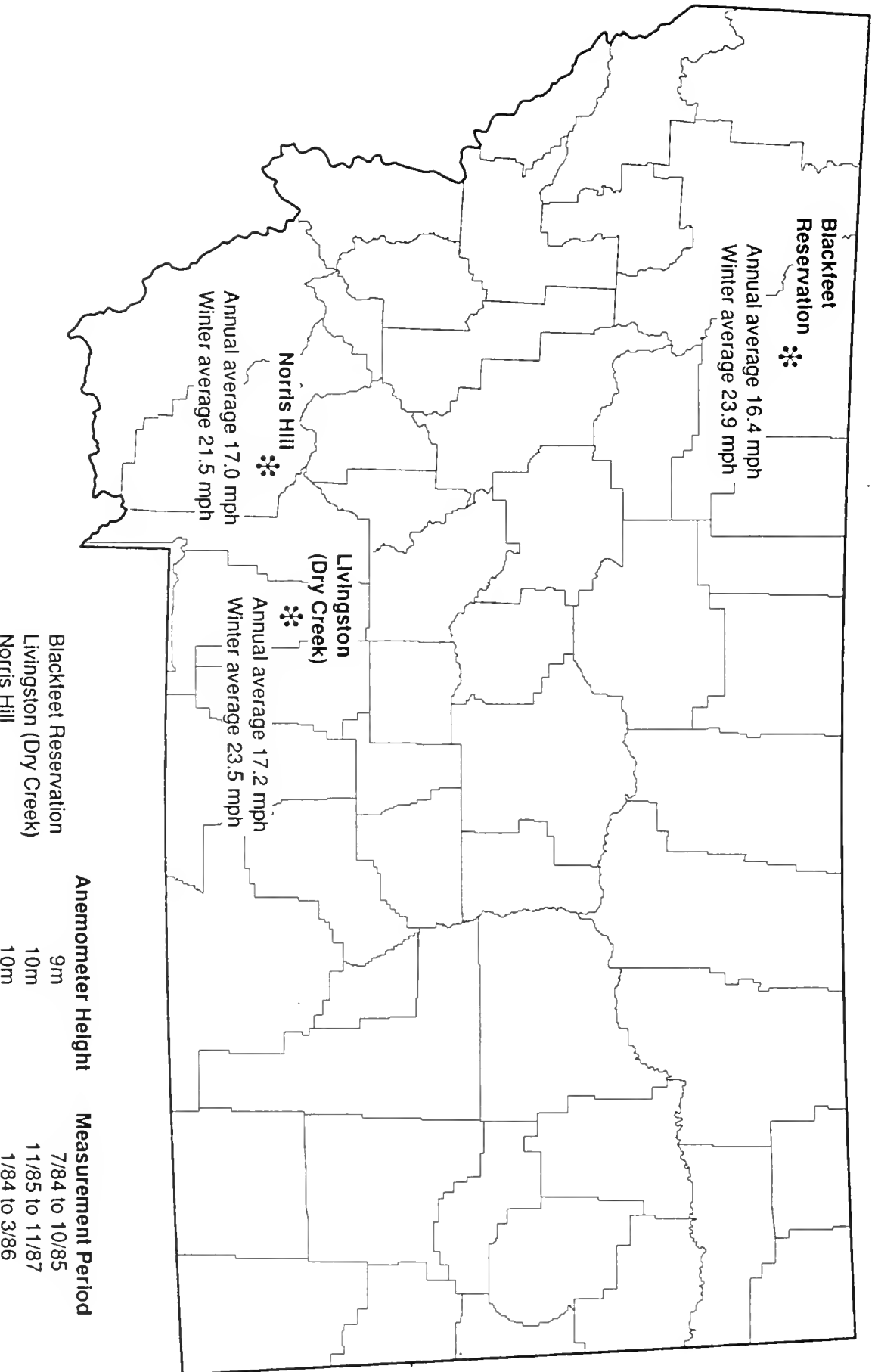
SEE  
DENVER-  
AULT  
AREA  
DETAIL

SEE  
SOUTHERN  
AREA  
DETAIL

SEE  
SEATTLE  
AREA  
DETAIL

SEE  
PORTLAND  
AREA  
DETAIL

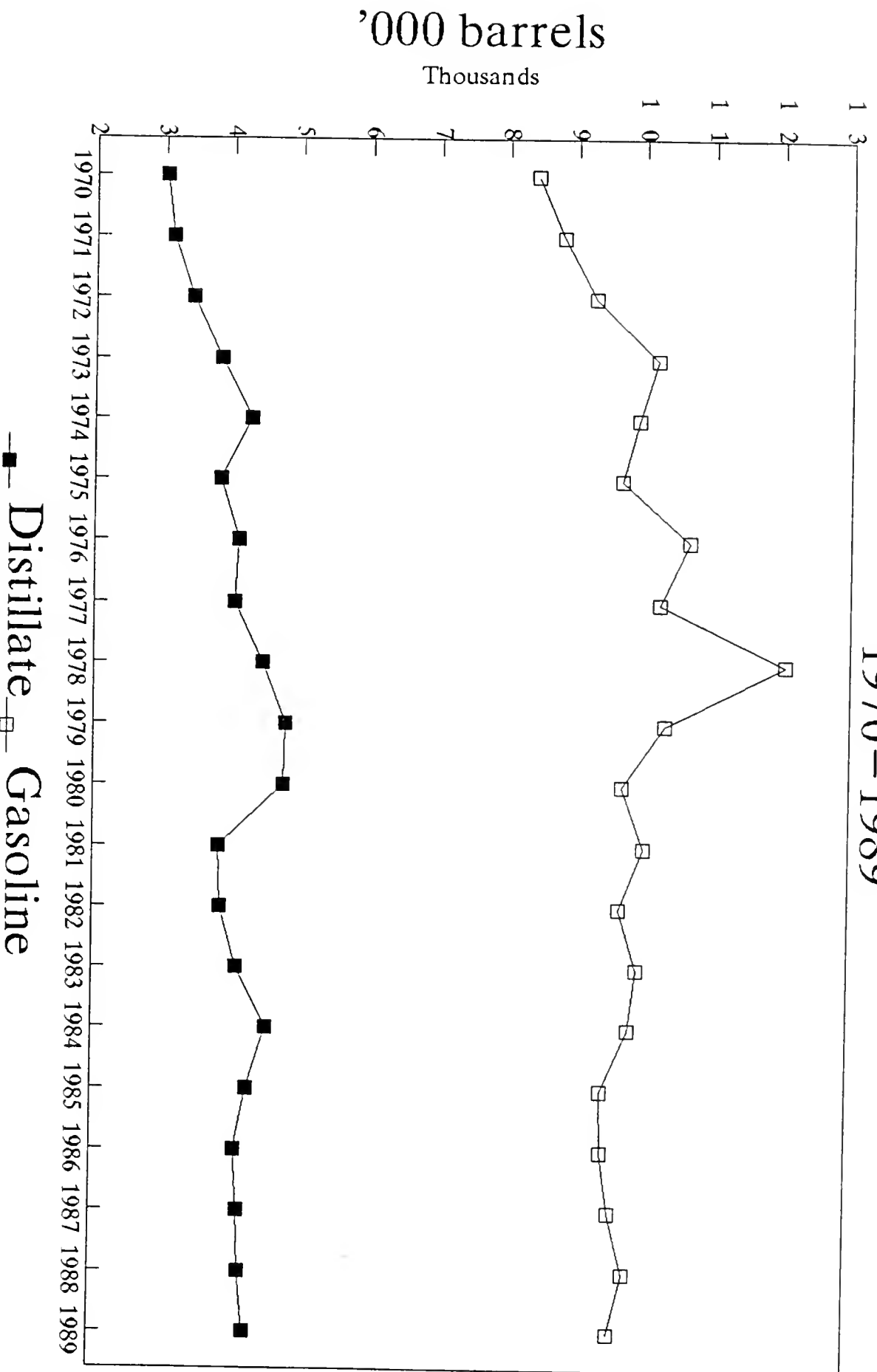
# Potential Wind Sites





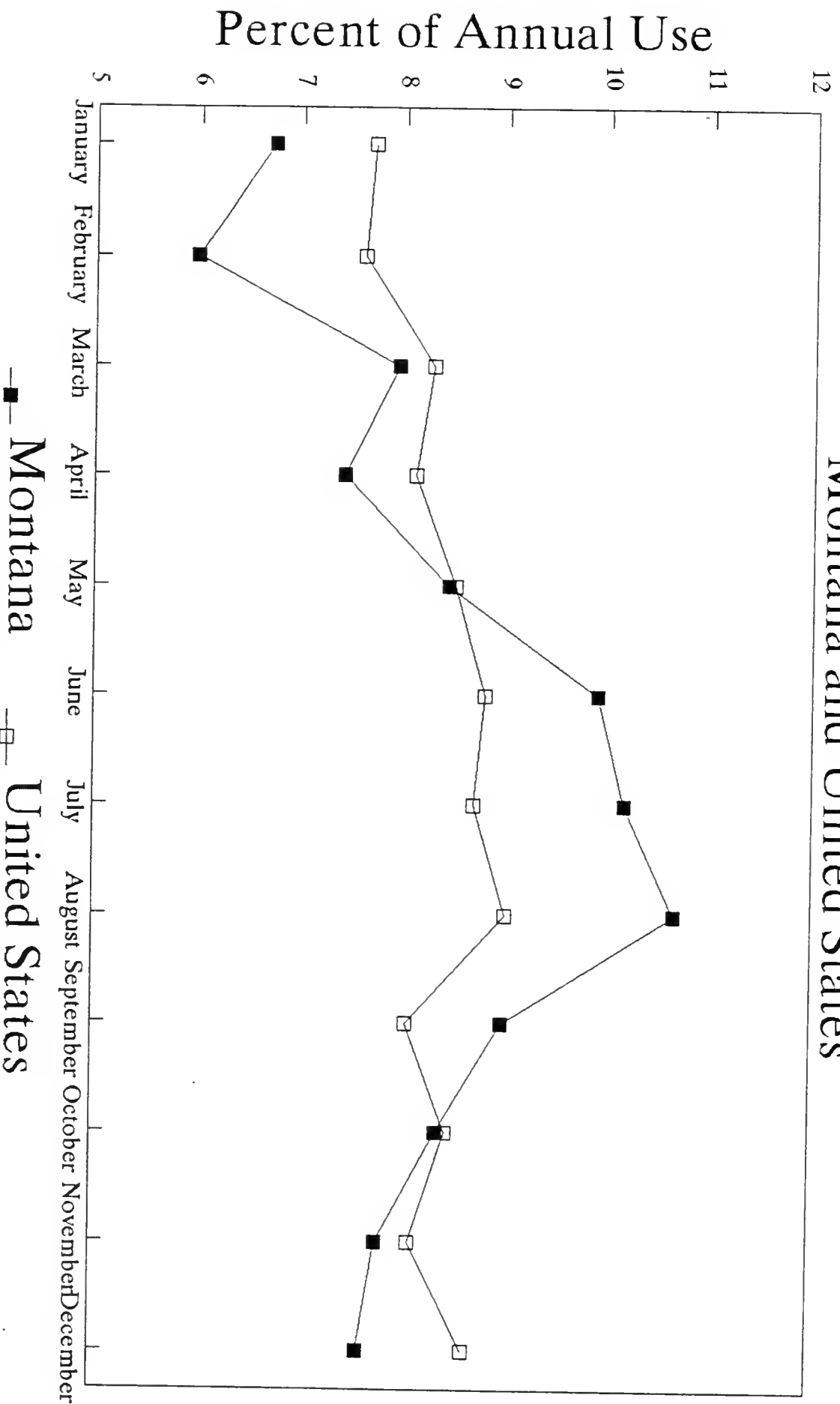
# TRANSPORTATION FUEL

1970-1989



# GASOLINE USE 1989

Montana and United States



Based on gross gallons of gasoline reported by wholesale distributors.  
This may reflect a month or more lag between wholesale and retail sales.

# FLEET EFFICIENCY

